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THE CENTRAL ILLINOIS TORNADO OF MAY 26, 1917

By J. P. CAREY

A remarkably large and well-developed cyclone moved across the central part of the Mississippi Basin on May 26, 27, and 28. It was marked by atmospheric conditions that resulted in a number of exceedingly violent tornadoes, among them one of the most destructive that ever visited Illinois. The writer was at the State Normal School in Charleston at the time the largest of the tornadoes passed through and destroyed a part of the city lying about a mile north of the school. The weather conditions were noted before and during the storm, and immediately afterward its destructive effects were observed from near Mattoon eastward for fifteen miles.

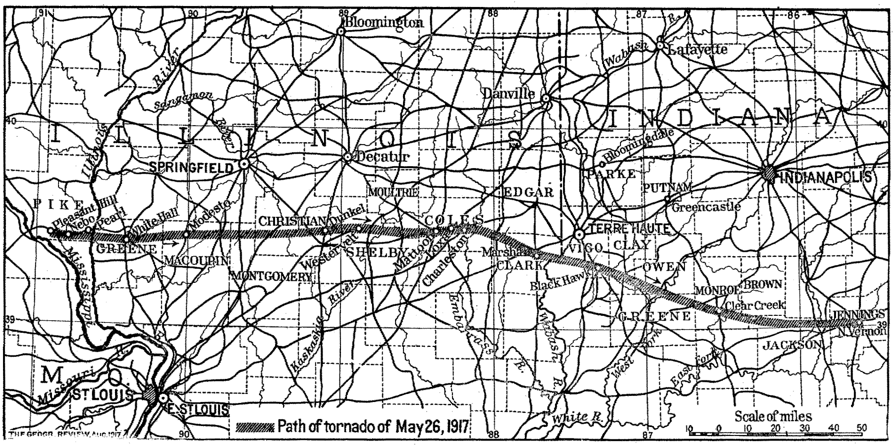

FIG. 1—Sketch-map showing the path of the tornado of May 26, 1917, across central Illinois and west-central Indiana. Scale, 1:4,200,000. The names of counties not in the tornado's path are omitted.

About noon of May 26, 1917, a tornado developed in Pike County, Illinois, near the little town of Pleasant Hill. Its path, which is about 287 miles long, stretches over almost the total width of Illinois and three-fourths of the width of Indiana, a length that is seldom attained by tornadoes. This distance was covered in seven hours and twenty minutes, or at an average velocity of about 40 miles per hour. This should not be confused with the velocity of the inflowing wind, which probably reached 400 miles an hour.

The tornado was remarkable for its severity as well as its length and was unusual in that it struck more towns than tornadoes generally do (see map, Fig. 1). It caused the deaths of over one hundred people and destroyed a large quantity of live stock, numerous farm buildings and other improvements, railroad cars, and portions of ten or more towns. These towns vary in size from a few hundred inhabitants to a city of 12,000. A conservative estimate of the total damage to real estate and personal property in Coles County, Illinois, is about \$2,500,000 and for the whole track \$3,000,000.

The greatest destruction was wrought in Coles County, where the tornado struck the districts occupied by workingmen's homes in the cities of Mattoon and Charleston, the former with a population of 12,000 and the latter with 6,000. The tornado passed through this county between 3 and 4 P. M., a time of day in which tornadoes are generally most disastrous. In Mattoon, at 3:30 P. M., sixty people were killed, and five hundred homes demolished and others seriously damaged. Traveling at about 45 miles per hour the storm struck Charleston, 11 miles east of Mattoon, at 3:45. Here, thirty-five persons were killed, over four hundred houses and fifteen industrial establishments partially or wholly wrecked, the two railway stations demolished, and all telegraph and telephone connections destroyed.

The width of the storm track varies from one-fourth to one-half of a mile, with an average of one-third of a mile. In some places minor damages resulted over an area about three-fourths of a mile wide to the south of the track. The storm's path indicates that the tornado swerved slightly in some places and in others rose high enough to prevent serious damage. A very good example of this is the case of the hamlet of Loxa, which lies midway between Mattoon and Charleston. Although this hamlet lay in the center of the path, it suffered only minor damages. Had the storm been as vigorous as in the two larger towns, Loxa would have been entirely razed. Another and more pronounced example of the lifting effect was found about four miles east of Charleston and one-half mile east of the Embarrass River. Here a farm house was smashed into splinters, and these splinters were blown a few rods into a gully, together with the farmer and his wife, who were killed, while twenty rods from where the house stood there is scarcely any evidence of vigorous wind action.

Destruction was greatest, in fact complete, in a zone from 500 to 700 feet wide to the right of the storm center's track. The sections of the two cities that were in this part of the storm track, with the exception of the heavier industrial buildings opposite the center of Charleston, were more completely demolished than if a gigantic roller had passed over them, for the buildings were broken into short sticks, split into narrow pieces, and some parts carried rods and even miles eastward. Inspection shows three zones of variable amounts of destruction: first, the zone of complete devastation; second, a zone from 300 to 500 feet wide to the left of the storm center's track, and a similar one of about the same width to the right of the devastated zone, where buildings were demolished beyond repair but not razed; and, third, a zone still farther to the right of the center, where damages decrease outward, from buildings moved to lifted roofs, fallen chimneys, and broken windows (see Fig. 6). The completeness of the destruction is exemplified by the accompanying photographs (Figs. 2, 3, 4, and 5). Objects to the right of the center were moved *forward and in* (east and north), while objects to the left of the center were moved *backward and in* (west and south). Trees and other objects which were near the center were felled either north

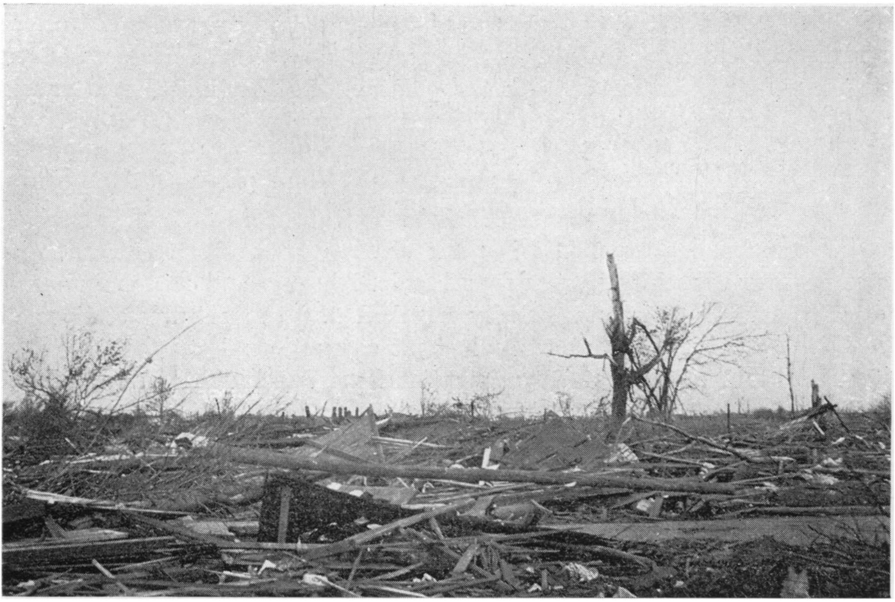

Fig. 2.

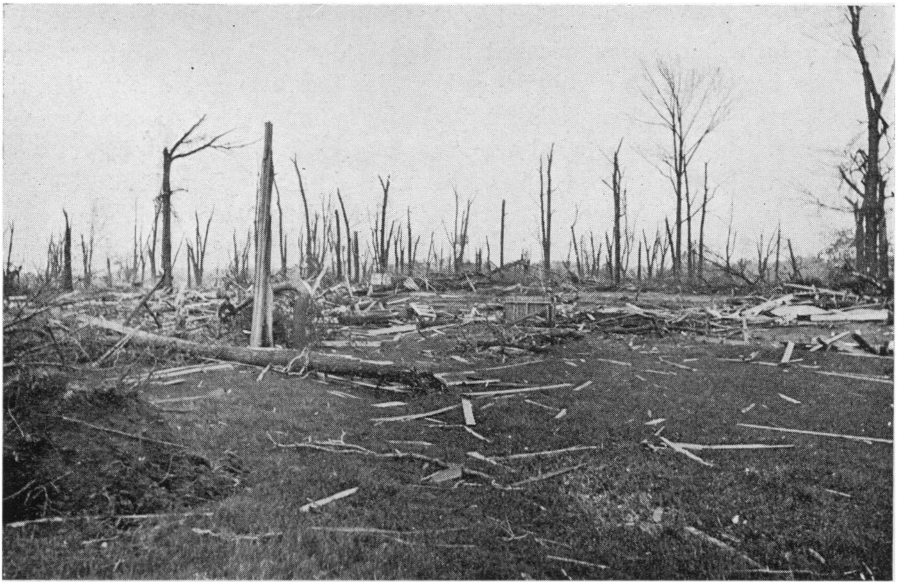

Fig. 3.

Fig. 2—A section of the devastated district, Mattoon, Ill.

Fig. 3—Coles County (Ill.) fair grounds after the storm. Formerly a beautiful park with numerous show buildings and barns. Nine race horses and a driver were killed here.

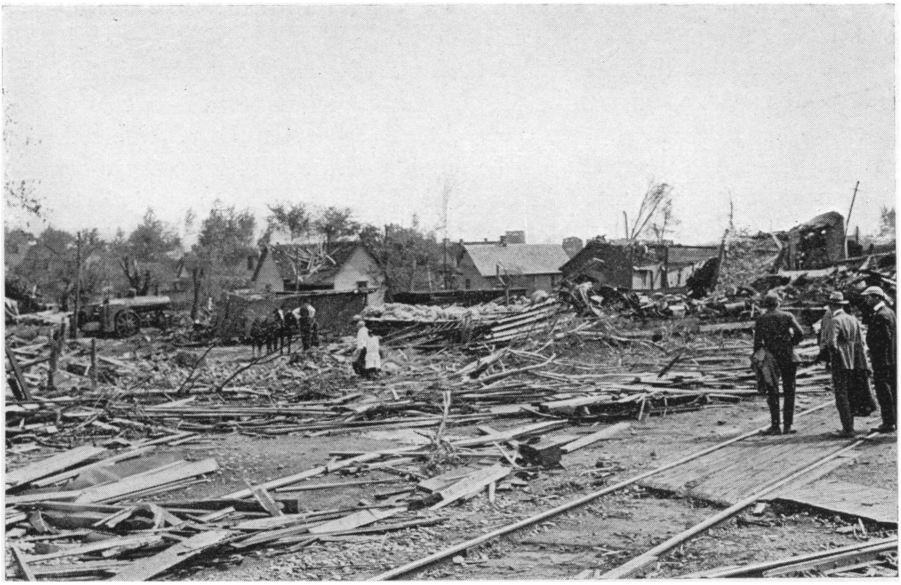

FIG. 4.

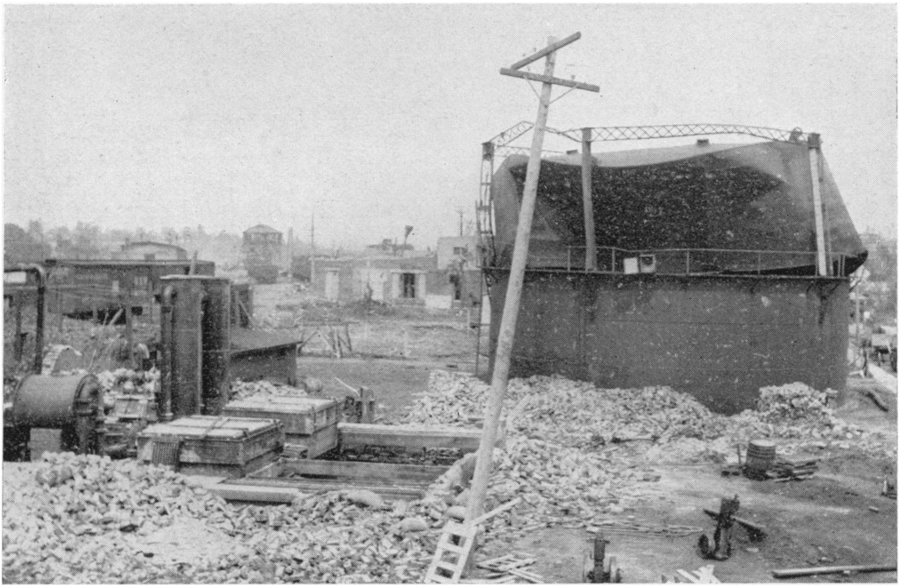

FIG. 5.

FIG. 4—Wreckage of two elevators at Charleston, Ill. The building at the left was of heavy paving brick. This was near the storm's center.

FIG. 5—Remains of the gas plant at Charleston, Ill., a brick structure.

or south; in fact, the position of such objects furnished the datum for establishing the path of the storm's center.

The reason for the location of the area of complete devastation to the right of the center seems to be plausibly explained when the agents of destruction are considered. On the right of the center the explosive action due to the reduced pressure on the outside of the buildings, the eastward component of the counter-clockwise wind of the tornado (probably over 400 miles per hour), the forward movement of the storm, and the west wind which was prevalent at that time, all worked in conjunction as agents of destruction; while on the left side of the center the westward component of the counter-clockwise wind was partially counterbalanced by the forward movement of the storm and the prevalent west wind. A deduction from this is that the greater the rate of transition of the storm, other conditions being equal, the less the destruction to the left of the center. However, the backward or east wind of the storm was strong enough to move an eight-room, one-story house 41 feet to the westward (see Fig. 7), others shorter distances, to break elm trees as large as 30 inches in diameter (see Fig. 8), and to throw down a large number of monuments in a cemetery in Mattoon.

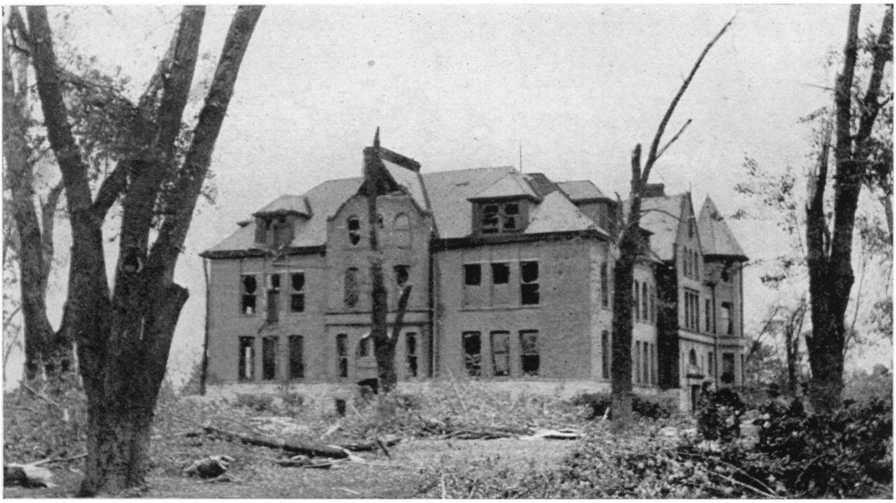

FIG. 6—Charleston (Ill.) high school, a building in the zone of partial destruction.

Evidence of the explosive action so frequently cited as the principal agent in tornado destruction is not lacking, but certainly it is not as general as one would expect. The north ends and the east roofs were pulled from some houses in the partially demolished districts; plate-glass windows were broken and fell out, and it is curious to note that the glass in lower sashes was broken more often than in the upper sashes; in one of the churches and in a store in which the glass was supported by metallic strips the windows were made convex, as also were the walls of a barn; one well containing

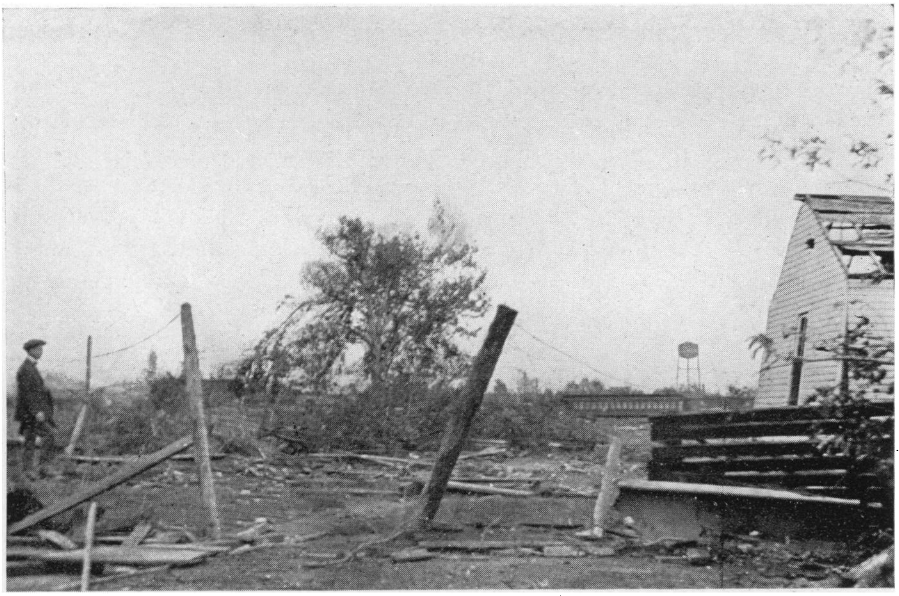

FIG. 7.

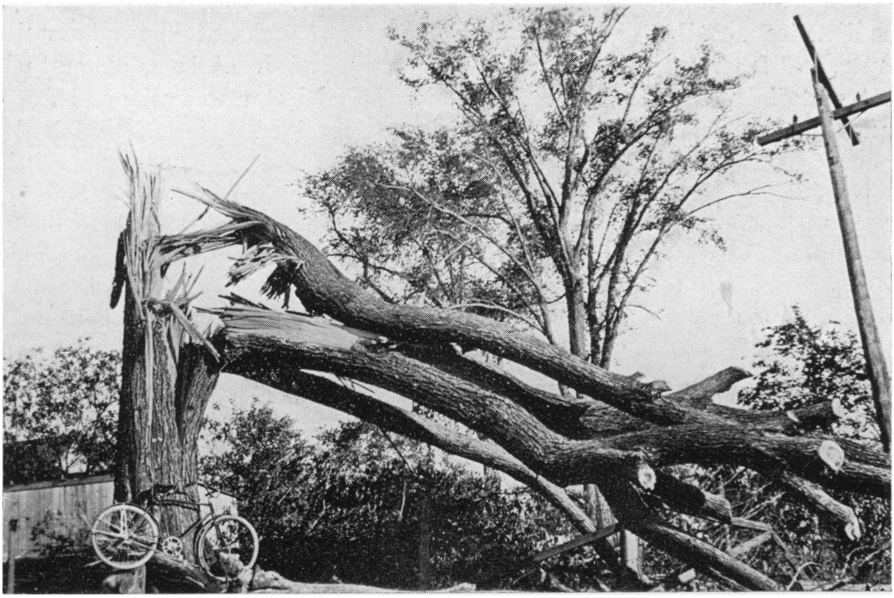

FIG. 8.

FIG. 7—View on the left side of the storm track. The house was moved 41 feet west and 12 feet south from where the man is standing.

FIG. 8—Broken tree overthrown to the west, i.e. on the left side of the storm track.

fourteen feet of water was sucked dry, and a quantity of water and a number of bricks of the curb of another well were removed; every article of furnishing, beds, dressers, chairs, rugs, and a large cedar chest, was sucked from the second floor of one house, and, except for the loss of windows and sashes, the house was uninjured; two negroes were stripped of all their clothing; and many birds were plucked clean of feathers. These cases all testify to the explosive and sucking actions, so-called, of the storm, which were caused by the great reduction of pressure as a result of the centrifugal movement of the air. Although the strong twisting wind appears to have been the chief agent of destruction, it is quite probable that, in and near the center of the storm, explosion was an important factor in preparing buildings for the subsequent crushing action of the wind.

Cases occurred of the well-known phenomenon of objects being driven into trees. Blunt cedar sticks were found imbedded an inch and a half deep in posts, and oat-straws half an inch deep in a maple tree. Another tree was decorated like an Indian's feather helmet. Huge oak and elm trees were twisted off, freight cars filled with brick were upset, as were also the tank cars of the Standard Oil Company. These things, and the buildings moved and crushed, indicate the force of the wind.

That the atmospheric disturbance reached a considerable height or that there was a continuous upward movement of the air, or both, is evidenced by the distance and direction to which mail, pieces of books, photographs, wall paper, and fragments of lath and plaster were carried. A large amount of such material was carried from Mattoon and Charleston to Parke and Putnam Counties, Indiana, according to reports received and mail sent back from Bloomingdale and Greencastle. This means that material was carried from 50 to 70 miles to the northeast, while the storm went southeast.

Phenomena which, for want of an explanation, are termed freaks were quite common. It was not unusual to see a house that was unharmed standing next to a building wrecked beyond repair. One of the accompanying photographs (Fig. 4) shows a section of Charleston in which small houses were not much harmed, while near them two well-built elevators and a number of freight cars were completely demolished. To the east and west of this same dwelling section the destruction was quite complete. This section of minor destruction is directly north of the business part of Charleston, and, although it is as much as three blocks distant from the zone in which the storm was generally effective, a number of store buildings in it were severely wrecked. The inference is that there the storm cloud settled down and covered a wider area, with the result that its force was somewhat dissipated and its destruction more extensive and less intensive.

METEOROLOGICAL CONDITIONS

The U. S. Weather Bureau daily weather map for St. Louis at 7 A. M. of the date of the storm (Fig. 9) shows a well-defined cyclonic area covering most of the interior lowland of the United States. The center of the low, which has a barometric pressure less than 29.4 inches, is in the vicinity of Sioux City, Iowa. Forty-eight hours later it had moved southeastward, so that the center was about Cincinnati, Ohio, and the pressure near the center of the low had increased to 29.5 inches. This is a movement of 600 miles in 48 hours, or an average of 12.5 miles per hour, an unusually slow rate for the movement of cyclones in the United States. The center of the low was in southeastern Iowa at the time the tornadoes occurred in Illinois; thus they developed in the southeastern quadrant of the low area. This low is remarkable in that the isobaric lines are oval in shape, with their long axis extending north and south. The isobars also show a slight bulge to the south in the southern quadrant—a condition favorable for sudden wind shift. A low of this shape and size in the middle Mississippi Valley in the spring and early summer months is especially favorable for the development of tornadoes. Cloudiness was prevalent and showers were common over most of the Mississippi Valley during the 24 hours preceding the tornadoes.

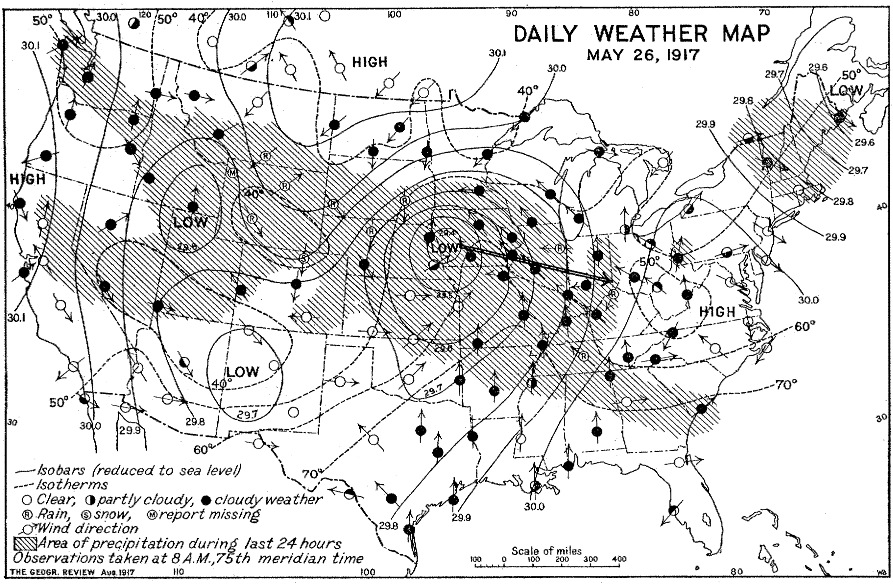
DAILY WEATHER MAP
MAY 26, 1917
HIGH
HIGH
HIGH
LOW
LOW
LOW
LOW
—Isobars (reduced to sea level)
---Isotherms
○ Clear, ◑ partly cloudy, ● cloudy weather
Ⓡ Rain, Ⓢ snow, Ⓜ report missing
Wind direction
▨ Area of precipitation during last 24 hours
Observations taken at 8 A.M., 75th meridian time
Scale of miles
100 0 100 200 300 400
THE GEOGR. REVIEW Aug. 1917
30.0
30.1
29.9
29.8
29.7
29.6
29.4
40°
50°
60°
70°
110
100
90
80
70

FIG. 9—Copy of the daily weather map of the U. S. Weather Bureau for May 26, 1917, issued at St. Louis, Mo. Scale, 1:42,000,000. The double-line arrow indicates the progress of the low-pressure area from western Iowa to southeastern Indiana during the forty-eight hours from 7 A. M. (Central Time) on May 26 to 7 A. M. on May 28.

At 11 A. M. a thunder shower occurred at Charleston. The clouds broke for a short time, but lights were necessary at 2 P. M., and the air was exceedingly sultry and oppressive. At 3 P. M. a heavy, black nimbus cloud appeared in the northwest, and frequent and fierce flashes of lightning occurred. Shortly before 3.45 a greenish-black cumulo-nimbus cloud began to tumble in from the west. The wind suddenly changed from east to west through the south, and hail began to fall. Then the hail lessened in amount and the wind attained a velocity of probably 80 miles per hour (judging from the trees broken and the material carried), the barometer dropped nearly 0.30 inch and rose immediately 0.40 inch and as suddenly returned to its starting point, the temperature fell 14° and then rose gradually (see barograph and thermograph records, Figs. 10-11). Suddenly the wind lulled, and flattened speroidal hailstones, some having a major axis of 2¼ inches, fell until the ground was covered. The hail was accompanied and followed by a deluge of rain. The precipitation was 1.81 inches for the 24 hours, and all but a very small part of this fell during the two hours immediately after the passage of the tornado.

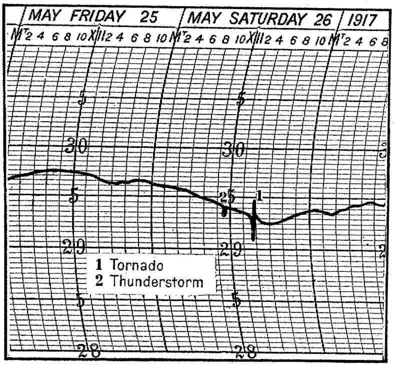

Fig. 10—Barograph record made at Charleston, Ill., one mile from the storm center.

Although the funnel or balloon-shaped cloud of the tornado was not visible to those in the cities, because of the trees, it was well described by numerous individuals who were west of the cities and to the right or left of the storm. Most of the people of the two larger cities who observed the action of the clouds maintain that two clouds or storms, one moving southwest and the other northeast, came together. It is curious to note that these reports came from two places eleven miles apart and that observers between the cities reported the funnel cloud. The explanation is probably this: When the view of the lower part of the funnel cloud is obscured, or the cloud has settled very low, the clouds at some distance from the earth and on the right or south side of the storm appear to be and really are coming in from the southwest, while those on the left or north side are moving west and south. The eastward and westward movements of the clouds are not perceptible to the observer in front of the approaching storm, and he sees only the northward and southward movements, and thus the clouds appear to be meeting. Furthermore, since the clouds on the south and east sides of the storm are moving toward the observer and are on the front of the storm, they are apt to contain more dust and less moisture than the backward moving clouds and therefore appear lighter in color.

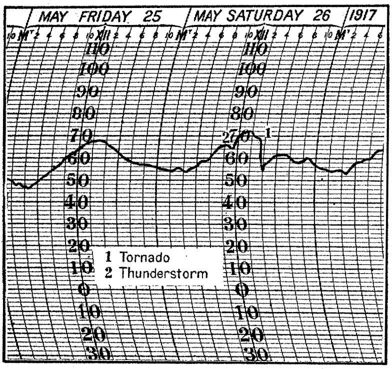

Fig. 11—Thermograph record made at Charleston, Ill., one mile from the storm center.